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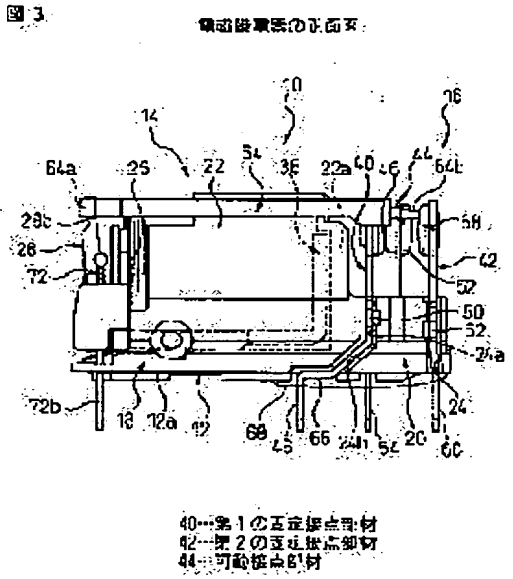
(54) ELECTROMAGNETIC RELAY

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an electromagnetic relay which can increase magnetic attraction force of an electromagnet while securing a predetermined insulating distance between an electromagnetic device and a contact without increasing an outer dimension, in the electromagnetic relay.
SOLUTION: In this electromagnetic relay 10, the first fixed contact member 40 of a contact part 16 has an extended part 66 arranged between a mounting part 50 and a first terminal 48. When the first fixed contact member 40 is properly fitted in first accepting grooves 24 of a base part 12, the mounting part 50 of the fixed contact member 40 is nonlinearly extended along the accepting grooves 24 while securing at least the predetermined insulating distance between the electromagnetic device 14. The extended part 66 is exposed to the outside from the accepting grooves 24, and extended in the direction for nearing a first part 18 along the lower face 12a of the base part 12. The extended part 66 is arranged almost in parallel to the coil center axial line of the electromagnet 26.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] It is included in a base, the electromagnet equipment built into this base, and this base, and the contact surface which carries out a switching action with actuation of this electromagnet equipment is provided. This contact surface The fixed contact member which only the predetermined distance for insulation separates, is arranged at least from this electromagnet equipment, and has a part for a part for a fixed contact surface, and the 1st terminal area, In an electromagnetic relay equipped with the traveling contact member which has a part for the 2nd terminal area which opposite arrangement was carried out with this electromagnet equipment in the opposite side at this fixed contact member, and was isolated from a part for the traveling contact part which can contact a part for this fixed contact surface, and this 1st terminal area Said base is equipped with the acceptance slot which receives said fixed contact member. Said fixed contact member The mounting area which is prepared between parts for a part for said fixed contact surface, and said 1st terminal area, and is inserted in said acceptance slot of said base to a longitudinal direction, While being prepared between parts for this mounting area and this 1st terminal area, having the extension which is outside exposed and is prolonged from this acceptance slot and this extension's securing said distance for insulation at least The electromagnetic relay characterized by being formed so that a predetermined terminal pitch may be maintained between parts for said 2nd terminal area of a part for this 1st terminal area, and said traveling contact member.
[Claim 2] The electromagnetic relay according to claim 1 which it is crooked, and said mounting area of said fixed contact member is prolonged, securing said distance for insulation at least by said acceptance Mizouchi of said base, collaborates with said extension by that cause, and maintains said terminal pitch.
[Claim 3] The electromagnetic relay according to claim 1 or 2 said whose distance for insulation is 2mm or more in a slant range.
[Claim 4] An electromagnetic relay given in any 1 term of claims 1-3 by which said extension is covered with adhesives.
[Claim 5] An electromagnetic relay given in any 1 term of claims 1-4 by which said extension of this fixed contact member is installed in abbreviation parallel by this coil medial-axis line while said electromagnet equipment is equipped with the electromagnet which has a coil and said fixed contact member and said traveling contact member are arranged together with the coil medial-axis line top of this electromagnet.

[Claim 6] It has further the end-winding child member of the pair by which said electromagnet equipment connects to each the both line edge of the armature driven with said electromagnet, and said coil of this electromagnet. While the end-winding child member of this pair is mutually isolated in the direction which intersects perpendicularly with said coil medial-axis line and is arranged to it Equip each with the end-of-line fixing part which fixes this end of line of this coil, and the terminal part which projects to a way outside said base, and each of these end-windings child member is crooked between this end-of-line fixing part and this terminal part. The electromagnetic relay according to claim 5 with which these end-of-line fixing parts of both the end-windings child member are arranged at bigger spacing than spacing of these terminal parts, and this armature is arranged between these end-of-line fixing parts.
[Claim 7] The electromagnetic relay according to claim 6 with which each of the end-winding child member of said pair has the cross-section configuration of an approximate circle form or an abbreviation regular polygon.
[Claim 8] The electromagnetic relay according to claim 6 or 7 with which the hollow in which said electromagnet has the winding frame which supports said coil and the end-winding child member of said pair, adjoins each of this end-winding child member at this winding frame, and holds the lead wire of this coil is formed.
[Claim 9] Said base is equipped with the 2nd acceptance slot which receives said traveling contact member. This traveling contact member it prepares between parts for said traveling contact part and said 2nd terminal area — having -- this base -- this -- with the mounting area inserted in the 2nd acceptance slot to a longitudinal direction Distribute near this traveling contact part, and while the main slit which is prepared, has the 1st and 2nd load part which receives the driving force from said electromagnet equipment, and promotes both relative displacement between this traveling contact part and this 1st load part is formed An electromagnetic relay given in any 1 term of claims 1-8 by which the dead air space wide opened by this 1st load part side to the longitudinal direction is formed between this traveling contact part and this mounting area.
[Claim 10] The electromagnetic relay according to claim 9 with which the auxiliary slit which promotes both relative displacement is formed between said traveling contact part of said traveling contact member, and said 2nd load part, and this auxiliary slit and said main slit have an unsymmetrical configuration for this traveling contact part of each other as a core.
[Claim 11] It is included in a base, the electromagnet equipment built into this base, and this base, and the contact surface which carries out a switching action with actuation of this electromagnet equipment is provided. This contact surface In an electromagnetic relay equipped with the fixed contact member which has a part for a part for a fixed contact surface, and the 1st terminal area, and the traveling contact member which has a part for the 2nd terminal area isolated from a part for the traveling contact part which can contact a part for this fixed contact surface, and this 1st terminal area Said base is equipped with the acceptance slot which receives said traveling contact member. Said traveling contact member The mounting area which is prepared between parts for said traveling contact part and said 2nd terminal area, and is inserted in said acceptance slot of said base to a longitudinal direction, Distribute near this traveling contact part, and while the main slit which is prepared, has the 1st and 2nd load part which receives the driving force from said electromagnet equipment, and promotes both relative displacement between this traveling contact part and this 1st load part is formed The electromagnetic relay characterized by forming the dead air space wide opened by this 1st load part side to the longitudinal direction between this traveling contact part and this mounting area.

[Claim 12] The electromagnetic relay according to claim 11 with which the auxiliary slit which promotes both relative displacement is formed between said traveling contact part of said traveling contact member, and said 2nd load part, and this auxiliary slit and said main slit have an unsymmetrical configuration for this traveling contact part of each other as a core.
[Claim 13] The electromagnetic relay according to claim 11 or 12 with which a part for the elastic arm which has said 1st load part and is arranged near said traveling contact part by said main slit is formed, and the amount of this elastic arm has the end face side field which adjoins

said dead air space and is extended.
[Claim 14] The electromagnetic relay according to claim 13 with which said end face side field for said elastic arm adjoins said dead air space, and is extended in the shape of a curve.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to an electromagnetic relay.
[0002]
[Description of the Prior Art] In the electromagnetic relay which comes to include electromagnet equipment and the contact surface which carries out a switching action with actuation of electromagnet equipment in a common base, in order to secure the insulation between electromagnet equipment and a contact surface, the thing which made the insulating wall formed in the base at one or another object intervene between electromagnet equipment and a contact surface is known.
[0003] For example, electromagnet equipment carries out opposite arrangement of the armature driven with an electromagnet rockable, and is constituted by the coil medial-axis line of an electromagnet at the iron core end face which carries out an abbreviation rectangular cross, and a contact surface carries out opposite arrangement of the traveling contact member rocked with rocking actuation of an armature, and the fixed contact member of the pair arranged at the both sides mutually along with the coil medial-axis line of an electromagnet in the opposite side of an armature, and consists of electromagnetic relays indicated by JP,7-1554,U. Moreover, a base is constituted in preparation for one in a part for a part for part I which has the cylindrical wall which surrounds electromagnet equipment partially, and part II which has two or more acceptance slots which receive the traveling contact member and fixed contact member of a contact surface according to an individual. With this configuration, while the cylindrical wall prepared in a part for part I of a base intervenes between electromagnet equipment and a contact surface and secures the insulation between both, the insulating member of another object is put side by side to the cylindrical wall that this insulating operation should be assisted.
[0004] In the above-mentioned electromagnetic relay, each contact member of a contact surface has a part for a part for the contact surface of a longitudinal direction end, and the terminal area of the longitudinal direction other end, and a mounting area between them, and is attached in the acceptance slot on the correspondence established in a part for part II of a base fixed by inserting each mounting area in a longitudinal direction from the one side edge. At this time, a part for each contact surface of the fixed contact member of a pair is arranged in the location which can carry out contact closing by turns corresponding to rocking actuation of an armature to a part for the contact surface of a traveling contact member located among them. on the other hand, them -- a part for each terminal area of movable and a fixed contact member is projected from a part for part II of a base to the method of outside, and alignment

arrangement is carried out in the bigger terminal pitch defined beforehand than contact-surface part spacing. It not only secures the distance for insulation beforehand defined between electromagnet equipment and a contact surface, but with such a configuration, in order to maintain the predetermined terminal pitch of a contact surface, the dimension of an electromagnetic relay becomes comparatively large in the direction of a coil medial-axis line of an electromagnet, and there is an inclination for unnecessary space to be formed in the perimeter for a contact surface of each contact member.

[0005] On the other hand, the electromagnetic relay indicated by JP,2000-268693,A, for example is what reduced effectively the dimensions to the direction of a coil medial-axis line, having the electromagnet equipment and the contact surface which have the same relative configuration as the electromagnetic relay of JP,7-1554,U. A part for a part for part I which has the cylindrical wall to which a base surrounds electromagnet equipment partially, and part II which has two or more acceptance slots which receive the traveling contact member of a contact surface and the fixed contact member of a pair according to an individual consists of this electromagnetic relay as another member mutually. And by combining a part for a part for part I, and part II, the cylindrical wall for part I intervenes between electromagnet equipment and a contact surface, and secures the insulation between both.

[0006] Each contact member of a contact surface has a part for a part for the contact surface of a longitudinal direction end, and the terminal area of the longitudinal direction other end, and a mounting area between them, and is attached in the acceptance slot on the correspondence established in a part for part II of a base fixed by inserting each mounting area in a longitudinal direction along with the edges on both sides. Here, the fixed contact member [on the other hand / (breaking side)] near electromagnet equipment has to both the extension which carries out an abbreviation rectangular cross between parts for a mounting area and a terminal area, lays this extension in the top face of the tabular field for part II adjoined and installed in two or more acceptance slots, and is attached in the base. And it is laid in the tabular field for part II while the amount of [of a base] part I piles up the base on the extension of the fixed contact member by the side of breaking, and it is combined with a part for part II. By that cause, a part for the terminal area of the fixed contact member by the side of breaking will be arranged under the part for part I, i.e., electromagnet equipment, of a base. Consequently, since a part for the contact surface of each contact member can be brought close to electromagnet equipment as much as possible, maintaining the predetermined terminal pitch of a contact surface, the dimensions of an electromagnetic relay are reduced in the direction of a coil medial-axis line.

[0007] By the way, as mentioned above, in case each contact member of a contact surface is attached in a base In the electromagnetic relay which has the configuration which inserts each contact installation part in the acceptance slot on the correspondence established in the base along with the edges on both sides to a longitudinal direction There is a fear of the traveling contact member which has comparatively thin thickness that necessary spring nature should be demonstrated especially producing the deformation (for example, relative location gap with a part for a part for a contact surface and a terminal area) which is not desirable by the thrust added at the time of insertion. Then, it forms from the closing-in components which have a part for a contact surface for a traveling contact member in this case, and the thick components which have a part for a mounting area and a terminal area, these 2 components of each other are connected fixed, and, generally the configuration which was made to carry out the load of the thrust at the time of insertion to a thick mounting area is adopted (for example, refer to JP,2000-149749,A and a U.S. Pat. No. 5,719,541 specification).

[0008]

[Problem(s) to be Solved by the Invention] As mentioned above, the electromagnetic relay indicated by JP,2000-268693,A In order to enable it to arrange a part for the terminal area of the fixed contact member by the side of breaking near electromagnet equipment under the electromagnet equipment After forming mutually a part for a part for part I of the base which supports electromagnet equipment, and part II of the base which supports each contact member as another member and attaching each contact member in a part for part II, a part for part I is attached to the extension of a breaking side fixed contact member in piles at a part for part II.

Therefore, when it is going to secure the predetermined distance for insulation between electromagnet equipment and a contact surface, there is the need of isolating an extension and electromagnet equipment with a necessary slant range further on the tabular field for base part II which laid the extension of a breaking side fixed contact member. Consequently, the technical problem to which the dimension of the height direction of an electromagnetic relay increases, and it decreases in number under given dimension constraint, the coil diameter direction dimensions, i.e., the coil installation tooth space, of an electromagnet, and the magnetic-attraction force becomes weak arises. And compared with the electromagnetic relay which has the base of integral construction, we are anxious about the rise of the manufacturing cost by the increment in components mark.

[0009] Moreover, as mentioned above, it forms from the closing-in components which have a part for a contact surface for a traveling contact member, and the thick components which have a part for a mounting area and a terminal area, and there is concern to which the manufacturing cost of an electromagnetic relay rises too with the configuration which connected these 2 components of each other fixed compared with the configuration which uses the traveling contact member of integral construction. Furthermore, in the electromagnetic relay, it has been a common technical problem to raise the contact life of each contact member in a contact surface.

[0010] the purpose of this invention increases the magnetic-attraction force of an electromagnet, without making a dimension increase while being able to secure the predetermined distance for insulation between electromagnet equipment and a contact surface, maintaining the predetermined terminal pitch in a contact surface -- it can make -- with -- **** -- it is in offering the electromagnetic relay which can acquire high structure dependability and the stable operating characteristic.

[0011] Other purposes of this invention are to offer the electromagnetic relay which avoids the increment in components mark and can control the rise of a manufacturing cost, without affecting structure dependability and an operating characteristic. The purpose of further others of this invention is to offer the electromagnetic relay which can raise the contact life of each contact member in a contact surface.

[0012]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention according to claim 1 It is included in a base, the electromagnet equipment built into this base, and this base, and the contact surface which carries out a switching action with actuation of this electromagnet equipment is provided. This contact surface The fixed contact member which only the predetermined distance for insulation separates, is arranged at least from this electromagnet equipment, and has a part for a part for a fixed contact surface, and the 1st terminal area, In an electromagnetic relay equipped with the traveling contact member which has a part for the 2nd terminal area which opposite arrangement was carried out with this electromagnet equipment in the opposite side at this fixed contact member, and was isolated from a part for the traveling contact part which can contact a part for this fixed contact surface, and this 1st terminal area Said base is equipped with the acceptance slot which receives said fixed contact member. Said fixed contact member The mounting area which is prepared between parts for a part for said fixed contact surface, and said 1st terminal area, and is inserted in said acceptance slot of said base to a longitudinal direction, While being prepared between parts for this mounting area and this 1st terminal area, having the extension which is outside exposed and is prolonged from this acceptance slot and this extension's securing said distance for insulation at least The electromagnetic relay characterized by being formed so that a predetermined terminal pitch may be maintained between parts for said 2nd terminal area of a part for this 1st terminal area and said traveling contact member is offered.

[0013] In an electromagnetic relay according to claim 1, it is crooked, said mounting area of said fixed contact member is prolonged, securing said distance for insulation at least by said acceptance Mizouchi of said base, and invention according to claim 2 offers the electromagnetic relay which collaborates with said extension by that cause, and maintains said terminal pitch.

[0014] Invention according to claim 3 offers the electromagnetic relay said whose distance for

insulation is 2mm or more in a slant range in an electromagnetic relay according to claim 1 or 2.
[0015] Invention according to claim 4 offers the electromagnetic relay by which said extension is covered with adhesives in an electromagnetic relay given in any 1 term of claims 1-3.
[0016] Invention according to claim 5 offers the electromagnetic relay with which said extension of this fixed contact member is installed in abbreviation parallel by this coil medial-axis line while said electromagnet equipment equips any 1 term of claims 1-4 with the electromagnet which has a coil in the electromagnetic relay of a publication and said fixed contact member and said traveling contact member are arranged together with the coil medial-axis line top of this electromagnet.
[0017] The armature to which said electromagnet equipment drives invention according to claim 6 with said electromagnet in an electromagnetic relay according to claim 5, While it has further the end-winding child member of a pair which connects the both line edge of said coil of this electromagnet to each, and the end-winding child member of this pair is mutually isolated in the direction which intersects perpendicularly with said coil medial-axis line and is arranged to it Equip each with the end-of-line fixing part which fixes this end of line of this coil, and the terminal part which projects to a way outside said base, and each of these end-windings child member is crooked between this end-of-line fixing part and this terminal part. The electromagnetic relay with which these end-of-line fixing parts of both the end-windings child member are arranged at bigger spacing than spacing of these terminal parts, and this armature is arranged between these end-of-line fixing parts is offered.
[0018] Invention according to claim 7 offers the electromagnetic relay with which each of the end-winding child member of said pair has the cross-section configuration of an approximate circle form or an abbreviation regular polygon in an electromagnetic relay according to claim 6.
[0019] In an electromagnetic relay according to claim 6 or 7, invention according to claim 8 has the winding frame to which said electromagnet supports said coil and the end-winding child member of said pair, adjoins each of this end-winding child member at this winding frame, and offers the electromagnetic relay with which the hollow in which the lead wire of this coil is held is formed.
[0020] Invention according to claim 9 is set to an electromagnetic relay given in any 1 term of claims 1-8. Said base It has the 2nd acceptance slot which receives said traveling contact member. This traveling contact member it prepares between parts for said traveling contact part and said 2nd terminal area — having — this base -- this — with the mounting area inserted in the 2nd acceptance slot to a longitudinal direction Distribute near this traveling contact part, and while the main slit which is prepared, has the 1st and 2nd load part which receives the driving force from said electromagnet equipment, and promotes both relative displacement between this traveling contact part and this 1st load part is formed The electromagnetic relay with which the dead air space wide opened by this 1st load part side to the longitudinal direction is formed between this traveling contact part and this mounting area is offered.
[0021] In an electromagnetic relay according to claim 9, the auxiliary slit which promotes both relative displacement between said traveling contact part of said traveling contact member and said 2nd load part is formed, and invention according to claim 10 offers the electromagnetic relay with which this auxiliary slit and said main slit have an unsymmetrical configuration for this traveling contact part of each other as a core.
[0022] Invention according to claim 11 is included in a base, the electromagnet equipment built into this base, and this base, and possesses the contact surface which carries out a switching action with actuation of this electromagnet equipment. This contact surface In an electromagnetic relay equipped with the fixed contact member which has a part for a part for a fixed contact surface, and the 1st terminal area, and the traveling contact member which has a part for the 2nd terminal area isolated from a part for the traveling contact part which can contact a part for this fixed contact surface, and this 1st terminal area Said base is equipped with the acceptance slot which receives said traveling contact member. Said traveling contact member The mounting area which is prepared between parts for said traveling contact part and said 2nd terminal area, and is inserted in said acceptance slot of said base to a longitudinal direction, Distribute near this traveling contact part, and while the main slit which is prepared,

has the 1st and 2nd load part which receives the driving force from said electromagnet equipment, and promotes both relative displacement between this traveling contact part and this 1st load part is formed The electromagnetic relay characterized by forming the dead air space wide opened by this 1st load part side to the longitudinal direction between this traveling contact part and this mounting area is offered.
[0023] In an electromagnetic relay according to claim 11, the auxiliary slit which promotes both relative displacement between said traveling contact part of said traveling contact member and said 2nd load part is formed, and invention according to claim 12 offers the electromagnetic relay with which this auxiliary slit and said main slit have an unsymmetrical configuration for this traveling contact part of each other as a core.
[0024] In an electromagnetic relay according to claim 11 or 12, a part for the elastic arm which has said 1st load part and is arranged by said main slit near said traveling contact part is formed, and invention according to claim 13 offers the electromagnetic relay with which the amount of this elastic arm has the end face side field which adjoins said dead air space and is extended.
[0025] Invention according to claim 14 offers the electromagnetic relay with which said end face side field for said elastic arm adjoins said dead air space, and is extended in the shape of a curve in an electromagnetic relay according to claim 13.
[0026]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail with reference to an accompanying drawing. In a drawing, a common reference mark is given to a same or similar component. When a drawing is referred to, the decomposition perspective view, drawing 2 , and drawing 3 of the electromagnetic relay 10 according [drawing 1] to the gestalt of operation of this invention are the perspective view and front view of an electromagnetic relay 10 which are shown where a case 70 is removed, respectively. An electromagnetic relay 10 is built into a base 12, the electromagnet equipment 14 built into a base 12, and a base 12, and is equipped with the contact surface 16 which carries out a switching action with actuation of electromagnet equipment 14.
[0027] A base 12 consists of resin mold goods of electric insulation, and equips one with a part for a part for part I 18 which installs electromagnet equipment 14, and part II 20 which installs a contact surface 16. The amount of [18] part I has the cylindrical wall 22 which surrounds electromagnet equipment 14 partially. Moreover, the amount of [20] part II has two or more acceptance slots 24 which receive two or more contact members which a contact surface 16 mentions later according to an individual. The cylindrical wall 22 for part I 18 intervenes between electromagnet equipment 14 and a contact surface 16, and secures the electric insulation between both.
[0028] Electromagnet equipment 14 is equipped with an electromagnet 26 and the armature 28 driven with an electromagnet 26. An electromagnet 26 is equipped with a winding frame 30, the coil 32 which twists around a winding frame 30 and is supported, and the iron core 34 attached in a winding frame 30 along with medial-axis line 32a of a coil 32 so that it may expand to drawing 4 and may be shown. Winding frames 30 are the resin mold goods of electric insulation, and have in one terminal supporter 30c (it mentions later) of the pair installed to the longitudinal direction of a drum section from the rim position of symmetry of the drum section of the hollow which has predetermined die length and which is not illustrated, the annular flanges 30a and 30b of the pair connected with the longitudinal direction both ends of a drum section, and one flange 30a.
[0029] A coil 32 winds the length-as-required part of lead wire around the drum section of a winding frame 30 densely, is formed in it, and is held fixed among both the flanges 30a and 30b of a winding frame 30. An iron core 34 is a pillar-shaped member formed from magnetic steel, and the concentric arrangement of the principal piece 34a of the shape of the approximate circle column are carried out to medial-axis line 32a of a coil 32, and it is received fixed in the drum section of a winding frame 30. Head 34b which has the flat end face which carries out an abbreviation rectangular cross is prepared in coil medial-axis line 32a in one, and this head 34b is exposed on the external surface of flange 30a of a winding frame 30, and is arranged at the direction end of an axis of an iron core 34. Moreover, direction other end of axis 34c of an iron

core 34 projects in the method of outside from flange 30b of another side of a winding frame 30.
[0030] The yoke 36 which forms a magnetic path around a coil 32 compares, and is connected with the iron core 34 of an electromagnet 26 by the foolish bundle fixed at the direction other end of axis 34c. A yoke 36 is L character plate-like part material formed from magnetic steel, and while the short length part is installed along with flange 30b of a winding frame 30, a long part estranges to the side of a coil 32, and is installed in coil medial-axis line 32a by abbreviation parallel. End 36a of the long part of a yoke 36 is arranged in head 34b of an iron core 34, and an abbreviation same location, and is connected with this end 36a free [rocking of an armature 28].
[0031] An armature 28 is a plate-like member formed from magnetic steel, and head 34b of an iron core 34 is countered, and it is arranged while connecting with a yoke 36 possible [elastic relative displacement] through flat spring 38. Flat spring 38 functions as an elastic hinge between a yoke 36 and an armature 28, and energizes an armature 28 according to a spring operation of itself in the direction which separates from head 34b of an iron core 34.
[0032] Quiescence maintenance of the armature 28 is carried out in the restoration location (refer to drawing 3) which only predetermined distance separated from head 34b of an iron core 34 at the time of un-operating [of an electromagnet 26] when the end (it is lower limit in drawing) section 28a was contacted by end 36a of a yoke 36 under the spring force of flat spring 38. If an electromagnet 26 operates, it will rock in the direction which an armature 28 resists the spring force of flat spring 38 according to the magnetic-attraction force centering on the engagement part of the lower limit section 28a and yoke end 36a, and approaches iron core head 34b.
[0033] A contact surface 16 is equipped with the fixed contact members 40 and 42 of the pair which vacates predetermined spacing mutually and is arranged along with coil medial-axis line 32a of an electromagnet 26, and the traveling contact member 44 which vacates predetermined spacing among these fixed contact members 40 and 42, and is arranged, and is constituted. The fixed contact members 40 and 42 are electric conduction plate members pierced and formed in a predetermined configuration from a copper plate. Moreover, the traveling contact member 44 is an electric conduction plate member pierced and formed in a predetermined configuration from the sheet metal of for example, the phosphor bronze for springs.
[0034] The 1st fixed contact member 40 of the direction near electromagnet equipment 14 is the opposite side of an armature 28, makes edge wall part 22a (drawing 3) of the cylindrical wall 22 of a base 12 intervene, and is arranged in the location which counters the yoke 36 of an electromagnet 26. Only the predetermined linear distance for insulation is isolated at least between the 1st fixed contact member 40 and a yoke 36 14, i.e., electromagnet equipment. Moreover, the traveling contact member 44 is the opposite side in electromagnet equipment 14, and opposite arrangement is carried out at the 1st fixed contact member 40. Furthermore, the 2nd fixed contact member 42 is the opposite side in the 1st fixed contact member 40, and opposite arrangement is carried out at the traveling contact member 44.
[0035] The 1st fixed contact member 40 has a part for the fixed contact surface 46 of a longitudinal direction end, and a part for the 1st terminal area 48 of the longitudinal direction other end and the mounting area 50 between them (refer to drawing 5). The traveling contact member 44 has the traveling contact part 52 of a longitudinal direction end, and a part for the 2nd terminal area 54 of the longitudinal direction other end and the mounting area 56 between them (refer to drawing 6). The 2nd fixed contact member 42 has a part for the fixed contact surface 58 of a longitudinal direction end, and a part for the 3rd terminal area 60 of the longitudinal direction other end and the mounting area 62 between them (refer to drawing 7).
[0036] Parts for the fixed contact surface 46 and 58 of each fixed contact members 40 and 42 are formed from a desired contact material, and they are connected so that it may bulge on the whole surface in each fixed contact members 40 and 42. The traveling contact part 52 of the traveling contact member 44 is formed from a desired contact material, and it is connected so that it may bulge on the both sides in the traveling contact member 44. In addition, although a part for the 2nd terminal area 54 of the traveling contact member 44 can be formed in parts for the 1st and 3rd terminal areas 48 and 60 of both the fixed contact members 40 and 42, and a list

as a foot of a pair like illustration, depending on the application of an electromagnetic relay 10, it can also constitute from a single foot or three or more feet.
[0037] These fixed contact members 40 and 42 and the traveling contact member 44 are attached in the acceptance slot 24 on the correspondence established in a part for part II 20 of a base 12 fixed by inserting each mounting areas 50, 56, and 62 in a longitudinal direction from the one side edge. In addition, the pieces 50a, 56a, and 62a of press fit pressed fit in the hollow (not shown) formed in the acceptance slot 24 on the correspondence are installed in a longitudinal direction by the mounting areas 50, 56, and 62 of each contact members 40, 42, and 44.
[0038] The amount of [of the 1st and 2nd fixed contact members 40 and 42 / 46 and 58] each fixed contact surface is the upper part for part II 20 of a base 12, and they are arranged in each predetermined location which is not changed substantially. The traveling contact part 52 of the traveling contact member 44 is the upper part for part II 20 of a base 12, and is arranged in the location which can carry out contact closing by turns at parts for the fixed contact surface 46 and 58 which carry out rocking displacement corresponding to rocking actuation of an armature 28, and are in the rocking direction both sides.
[0039] On the other hand, a part for the 2nd terminal area 54 of the traveling contact member 44 is projected from a part for part II 20 of a base 12 to a lower part, it is the bigger terminal pitch defined beforehand than contact-surface part spacing, and it aligns in parts for each 1st and 3rd terminal areas 48 and 60 of the 1st and 2nd fixed contact members 40 and 42, and a list in the direction parallel to coil medial-axis line 32a (drawing 4) of an electromagnet 26, and regular-intervals arrangement is carried out to it at them. In addition, the 1st fixed contact member 40 of the direction near electromagnet equipment 14 constitutes break contact, and the 2nd fixed contact member 42 of the one distant from electromagnet equipment 14 constitutes make contact from an illustration implementation gestalt.
[0040] The traveling contact member 44 is connected with an armature 28 through the connection member 64 of electric insulation. It is the frame material really fabricated from a resin ingredient, and is the longitudinal direction end 64a, and it connects with free-end (it is upper limit in drawing) 28b of the armature 28 of the side which is separated from a yoke 36, and it is longitudinal direction other end 64b, and the connection member 64 is connected with the free end (it is upper limit in drawing) of the traveling contact member 44 of the side which is distant from a base 12. The connection member 64 is interlocked with rocking actuation of the armature 28 accompanying excitation / un-exciting, carries out both-way actuation in the direction substantially parallel to coil medial-axis line 32a (drawing 4), and, thereby, transmits rocking actuation of an armature 28 to the traveling contact member 44 as follows. [of an electromagnet 26]
[0041] In the restoration location shown in drawing 3 , as mentioned above, an armature 28 is in the condition that only predetermined distance separated from head 34b of an iron core 34 under the spring force of flat spring 38. At this time, the connection member 64 is put on one limitation of that both-way successive range, the traveling contact part 52 of the traveling contact member 44 connected with that other end 64b carries out flow contact by that cause at a part for the fixed contact surface 46 of the 1st fixed contact member 40, and break contact is closed. It rocks in the direction which an armature 28 will resist the spring force of flat spring 38 according to the magnetic-attraction force centering on the engagement part of that lower limit section 28a and yoke free edge 36a, and will approach iron core head 34b from this restoration location if an electromagnet 26 operates. In connection with it, the connection member 64 moves towards the limitation of another side of a both-way successive range, and it bends elastically so that the 2nd fixed contact member 42 may be approached in the traveling contact member 44. When iron core head 34b is adsorbed in an armature 28, the connection member 64 reaches the limitation of another side of a both-way successive range, the traveling contact part 52 carries out flow contact at a part for the fixed contact surface 58, and make contact is closed.
[0042] The electromagnetic relay 10 which has the above-mentioned configuration can secure the predetermined distance for insulation between electromagnet equipment 14 and a contact surface 16, maintaining the predetermined terminal pitch in a contact surface 16. For example,

when applying an electromagnetic relay 10 to the general-purpose power relay which can be carried in various industrial devices, it is required that the distance for insulation (it is 2mm at a slant range) according to the Verband Deutscher Elecktrotechniker (VDE) specification 0631 should be secured. Furthermore, the following characteristic configurations for enabling it to apply to this kind of specification are used for an electromagnetic relay 10 under given dimension constraint.

[0043] The inside of three acceptance slots 24 established in a part for part II 20 of a base 12 in the electromagnetic relay 10 as shown in drawing 3 , Vertical field 24a which the 1st acceptance slot 24 which receives the 1st fixed contact member 40 extends in the direction which carries out an abbreviation rectangular cross in coil medial-axis line 32a (drawing 4) of an electromagnet 26, and carries out opening to the top-face side of a base 12, It extends in the direction which is connected with an obtuse angle at vertical field 24a, and approaches a part for part I 18, and it has inclination field 24b which carries out opening to the inferior-surface-of-tongue 12a side of a base 12, and is formed.

[0044] Moreover, the amount of [vertical field 50b in which the mounting area 50 has piece of press fit 50a corresponding to the crookedness configuration of the 1st above-mentioned acceptance slot 24, and / 46] fixed contact surface has inclination field 50c connected with an obtuse angle in the opposite side at vertical field 50b, and the 1st fixed contact member 40 of a contact surface 16 is formed. Furthermore, the fixed contact member 40 has inclination field 50c of a mounting area 50, and the extension 66 prepared between parts for the 1st terminal area 48. As shown in drawing 3 and drawing 5 , an extension 66 carries out an abbreviation rectangular cross, and is installed by vertical field 50b of a mounting area 50, and both for the 1st terminal area 48.

[0045] It is installed in the direction which is crooked along the acceptance slot 24, extends, securing the distance for insulation predetermined [at least] in the mounting area 50 of the fixed contact member 40 to between electromagnet equipment 14 if the fixed contact member 40 of ** a 1st is inserted in the acceptance slot 24 of ** the 1st of a base 12 proper, exposes an extension 66 outside from the acceptance slot 24, and approaches a part for part I 18 along with inferior-surface-of-tongue of base 12 12a. At this time, it is arranged at abbreviation parallel at coil medial-axis line 32a of an electromagnet 26, an extension 66 securing the predetermined distance for insulation at least between electromagnet equipment 14.

[0046] A part for the 1st terminal area 48 of the 1st fixed contact member 40 is deflected in the direction which approaches a part for part I 18 of a base 12 to vertical field 50b of a part for the fixed contact surface 46, and a mounting area 50 by collaboration with inclination field 50c of a mounting area 50, and an extension 66, is arranged, and, thereby, is positioned under the electromagnet equipment 14. Consequently, in a contact surface 16, the terminal pitch which the amount of [54] 2nd contact surface of the traveling contact member 44 set to a part for the 1st and 3rd contact surfaces 48 of the 1st and 2nd fixed contact members 40 and 42 and 60 lists beforehand along with inferior-surface-of-tongue 12a of a base 12 is maintained, and regular-intervals arrangement is carried out.

[0047] With an electromagnetic relay 10, since the traveling contact part 52 of the parts for the fixed contact surface 46 and 58 and the traveling contact member 44 of the fixed contact members 40 and 42 can be brought close to electromagnet equipment 14 as much as possible, maintaining the predetermined terminal pitch in a contact surface 16, dimensions are reducible in the direction of coil medial-axis line 32a with such a configuration. At this time, the predetermined distance for insulation (for example, 2mm or the slant range beyond it according to VDE specification 0631) is secured between electromagnet equipment 14 and the 1st fixed contact member 40. And since it exposes to inferior-surface-of-tongue 12a of a base 12 and the extension 66 of the 1st fixed contact member 40 is arranged, it can secure the great portion of distance for insulation only by the thickness of the correspondence field for base part I 18 which intervenes between an extension 66 and electromagnet equipment 14. Therefore, the increment in the dimension of the height direction of an electromagnetic relay 10 can be controlled effectively. Moreover, under given dimension constraint, since it can expand, the coil diameter direction dimension, i.e., the coil installation tooth space, of an electromagnet 26, and

the magnetic-attraction force can be conventionally raised compared with structure, the electromagnetic relay 10 which has high structure dependability and the stable operating characteristic is offered.
[0048] Furthermore, with an electromagnetic relay 10, since the configuration which inserts the mounting area 56 of the traveling contact member 44 in a longitudinal direction in the acceptance slot 24 of correspondence for base part II 20 at the mounting area 50 of the 1st and 2nd fixed contact members 40 and 42 and 62 lists was adopted In spite of being located by the amount of [48] 1st terminal area of the 1st fixed contact member 40 under [for base part I / 18], a base 12 can really containing parts for the 1st and part II 18 and 20 be formed as mold goods. Moreover, especially the thrust to the longitudinal direction which joins a mounting area 56 also in the traveling contact member 44 which has comparatively thin thickness that necessary spring nature should be demonstrated at the time of insertion into the acceptance slot 24 Since it becomes a thing without a fear of making the traveling contact member 44 produce the deformation (for example, the traveling contact part 52 and the relative location gap with a part for the 2nd terminal area 54) which is not desirable, the traveling contact member 44 can really containing a part for the traveling contact part 52 and the 2nd terminal area 54 be formed as mold goods. Consequently, in an electromagnetic relay 10, without affecting structure dependability and an operating characteristic, the increment in components mark is avoided and the rise of a manufacturing cost can be controlled.
[0049] In addition, as for the extension 66 of the 1st fixed contact member 40, in the above-mentioned configuration, it is advantageous that the whole is preferably covered with the adhesives 68 (drawing 3) for fixing each contact members 40, 42, and 44 to a base 12 at the point which raises the external insulation of the fixed contact member 40, and dirt-proof nature. Since such an adhesives spreading process can divert the adhesives spreading process currently carried out conventionally as it is, the increment in a man day is avoided. Furthermore, the electromagnetic relay 10 as a product is completed by holding and carrying out the fixed coupling of the main structures assembled by doing in this way to the case 70 shown in drawing 1 .
[0050] In the electromagnetic relay 10, other option-policies for raising the magnetic-attraction force of the electromagnet 26 in electromagnet equipment 14 under given dimension constraint are adopted. As shown in drawing 4 , the end-winding child member 72 of a pair which consists of an electric good conductor is attached in the direction which carries out an abbreviation rectangular cross fixed by the arrangement isolated mutually at terminal supporter 30c of the pair prepared in the winding frame 30 of an electromagnet 26 at coil medial-axis line 32a. The lead wire which forms a coil 32 is connected to these end-windings child member 72 at the both line edge, respectively.
[0051] Each end-winding child member 72 is equipped with end-of-line fixing partial 72a which projects [upper part /, i.e., the side of iron core head 34a near,] from terminal supporter 30c of correspondence of a winding frame 30, and terminal partial 72b which projects from terminal supporter 30c to a lower part. each end of line of a coil 32 should be involved in end-of-line fixing partial 72a of each end-winding child member 72 -- it fixes by ****** 74, for example, solder. Moreover, terminal partial 72b of each end-winding child member 72 passes along the slot 76 prepared in a part for part I 18 of a base 12 which installs electromagnet equipment 14, and projects in the exterior of an electromagnetic relay 10. Terminal partial 72b of both the end-windings child member 72 is arranged at spacing (terminal pitch) defined beforehand along with inferior-surface-of-tongue 12a of a base 12.
[0052] Each end-winding child member 72 is a request part between end-of-line fixing partial 72a and terminal partial 72b (directly under [like / For example, / illustration / of terminal supporter 30c of correspondence]), and is bent twice by the abbreviation right angle in an opposite direction. this time -- end-of-line fixing partial 72a and terminal partial 72b -- mutual -- abbreviation -- it is turned in the parallel direction. And each end-winding child member 72 is attached in terminal supporter 30c of correspondence so that spacing of end-of-line fixing partial 72a of both the end-windings child member 72 may become larger than spacing of terminal partial 72b.
[0053] Since spacing of those end-of-line fixing partial 72a is expandable according to such a

configuration, maintaining the terminal pitch of the end-winding child member 72 of a pair in a predetermined dimension, it is the armature 28 by which opposite arrangement is carried out, especially a longitudinal direction dimension can be extended to the iron core head 34 between both line edge fixing partial 72a. If spacing of end-of-line fixing partial 72a is expanded in the range which each end-winding child member 72 does not jut out of flange 30a of a winding frame 30 to the side at this time, the magnetic-attraction force of an electromagnet 26 can be effectively raised by expanding the magnetic-path cross section of the armature 28 which is a magnetic-circuit component part under given dimension constraint of an electromagnetic relay 10.

[0054] In addition, as for each of the end-winding child member 72 of a pair, with this configuration, it is desirable to have the cross-section configuration of an approximate circle form or an abbreviation regular polygon. If it is made such, the advantage which does not ask substantially the configuration (the configuration and directivity of a contact part) of the contact components (for example, a connector, a socket, the circuit board, etc.) of the connection partner of the end-winding child member 72 will arise.

[0055] Moreover, it is advantageous to adjoin the end-winding child member 72 of correspondence, and to form the hollow 78 in which the lead wire of a coil 32 can be held in each of terminal supporter 30c of the pair prepared in the winding frame 30 of an electromagnet 26 in an electromagnetic relay 10, (drawing 9 R> 9 (a), (b)). Where both the tips of the lead wire of a coil 32 are fixed proper to end-of-line fixing partial 72a of the end-winding child member 72 of correspondence, the part 79 near the end of line of lead wire is held in the hollow 78 of both-ends child supporter 30c, respectively. According to such a configuration, a fear of the erector of an electromagnet 26 and an electromagnetic relay 10 making the part 79 near the end of line of lead wire fracture more carelessly to inside is avoided substantially.

[0056] Furthermore, in the electromagnetic relay 10, the following characteristic configuration for raising the contact life of each contact members 40, 42, and 44 in a contact surface 16 is adopted. As shown in drawing 6 and drawing 10 , it has the 1st and 2nd load parts 80 and 82 which distribute the traveling contact member 44 near the traveling contact part 52, and are prepared, and the main slit 84 which promotes independent relative displacement with these traveling contact part 52 and the 1st load part 80 between the traveling contact part 52 and the 1st load part 80 is formed. The 1st and 2nd load parts 80 and 82 have in each the notch formed in the edges on both sides of the free-end field of the traveling contact member 44, and two projections which constitute longitudinal direction other end 64b of the connection member 64 mentioned above in these notches are inserted, respectively. Thereby, the load of the driving force from electromagnet equipment 14 is carried out to both the loads parts 80 and 82 of the traveling contact member 44 substantially equally through the connection member 64.

[0057] The main slit 84 is prolonged in the shape of L character between the traveling contact part 52 and the 1st load part 80 from the upper limit edge of the traveling contact member 44 to the lower part location of the traveling contact part 52. Moreover, between the traveling contact part 52 and a mounting area 56, the dead air space 86 wide opened by the 1st load part 80 side to the longitudinal direction is formed. Consequently, a part for the elastic L character-like arm 88 which has the 1st load part 80 is formed in the near location of the traveling contact part 52. A part for the elastic arm 88 is connected with a part for the principal piece 90 prolonged between the traveling contact part 52 of the traveling contact member 44, and a mounting area 56 at one, and the end face side field 88a is arranged through dead air space 86 at abbreviation parallel at piece of press fit 56a of a mounting area 56.

[0058] In addition, while serrated knife-like projection 56b protrudes along one edge of piece of press fit 56a which adjoins dead air space 86, protruding line 56c prolonged to a longitudinal direction in accordance with the whole surface of piece of press fit 56a protrudes on the mounting area 56 of the traveling contact member 44. These projection 56b and protruding line 56c act so that it may fix firmly and piece of press fit 56a may be positioned proper in the hollow (not shown) prepared in the acceptance slot 24 of correspondence of a base 12. Moreover, between parts for a mounting area 56 and the 2nd contact surface 54, the extension 92 which carries out an abbreviation rectangular cross is formed in both. An extension 92 acts so that a

part for the 2nd contact surface 54 may be deflected and arranged to the traveling contact part 52 like the extension 66 of the 1st fixed contact member 40 in the direction close to a part for part I 18 of a base 12.
[0059] As mentioned above, the traveling contact member 44 bends a mounting area 56 elastically at the supporting point in response to the force in the life performance of the armature 28 in electromagnet equipment 14 through the connection member 64. Especially the traveling contact member 44 demonstrates the predetermined spring force which resists the magnetic-attraction force until iron core head 34b of an electromagnet 26 is completely adsorbed in an armature 28 from the moment the traveling contact part 52 contacted parts for one of the fixed contact surface 46 and 58, in case contact closing actuation is carried out to either of the 1st [which counters], and 2nd fixed contact members 40 and 42.
[0060] The traveling contact member 44 which has the above-mentioned configuration here The thrust which joins equally [abbreviation] the 1st and 2nd load parts 80 and 82 through the connection member 64 from electromagnet equipment 14 until an armature 28 results in full adsorption, While it mainly concerns for an elastic arm [88] in response to the thrust to the hard flow which joins a contact partner's traveling contact part 52 from parts for the fixed contact surface 46 and 58 and end face side field 88a bends, it deforms so that it may be twisted by the amount of [90] principal piece to a mounting area 56. The main slit 84 produces such a twist for a principal piece [90] from dividing substantially between the traveling contact part 52 and the 1st load parts 80, and permitting both independent relative displacement. Thereby, the traveling contact part 52 carries out rocking displacement of the 2nd load part 82 elastically as a substantial core. Consequently, the point of contact P for the other party fixed contact surface 46 and 58 first located focusing on the abbreviation for the traveling contact part 52 moves in the direction of illustration arrow-head A gradually until an armature 28 results [from the initial contact] in full adsorption. Such a configuration to which the point of contact P of the traveling contact part 52 is moved does so the effectiveness of controlling the increment in the contact resistance which may be produced while repeating a contact switching action, and raising a contact life.
[0061] being such -- migration -- a point of contact -- a configuration -- for example, -- drawing -- 1111 -- being shown -- as -- a traveling contact -- a part -- 52 -- the upper part -- namely, -- dead air space -- 86 -- the opposite side -- elasticity -- an arm -- a part -- 88 -- a end face -- a side -- a field -- 88 -- a -- having arranged -- a traveling contact -- a member -- 44 -- ' -- being realizable . In traveling contact member 44', the die length for the principal piece 90 prolonged between the traveling contact part 52 and a mounting area 56 can be shortened compared with the traveling contact member 44. therefore, it is shown in drawing 12 in this case -- as -- a part for the elastic arm 88 -- the near 1st and 2nd load parts 80 and 82 -- bending -- that end face side field 88a -- abbreviation -- arranging horizontally -- the height of traveling contact member 44' itself -- reducible -- with -- **** -- it can contribute to much more low back-ization of an electromagnetic relay 10.
[0062] With the configuration of the above-mentioned traveling contact member 44, just before iron core head 34b of an electromagnet 26 is completely adsorbed in an armature 28, it originates mainly in the increment in the twist load in a part for a principal piece 90, and there is an inclination for a spring load to go up comparatively steeply. Usually, an electromagnetic relay 10 is designed so that such a spring load in the traveling contact member 44 may not exceed the magnetic-attraction force fluctuated according to the life performance of an armature 28. However, it is alike, the frictional resistance to point-of-contact migration whose contact front face is ruined with the repeat of a contact switching action increases, consequently a spring load may exceed the magnetic-attraction force just before full adsorption of an armature 28. In such a case, since an armature 28 cannot result in full adsorption, we are anxious about actuation of an electromagnetic relay 10 becoming imperfectly and unstable, and the movement magnitude of a point of contact P being remarkably insufficient, and becoming easy to produce contact joining.

[0063] Drawing 13 shows the traveling contact member 94 by other operation gestalten of this invention which has a characteristic configuration for wiping away such concern. The traveling

contact member 94 is equipped with the auxiliary slit 96 which promotes independent relative displacement with the traveling contact part 52 and 2nd load part 82. In addition, except having carried out additional formation of the auxiliary slit 96, the configuration of the traveling contact member 94 gives a common sign to the component which corresponds since it is substantially the same with the above-mentioned traveling contact member 44, and omits the explanation. Moreover, actuation of an electromagnetic relay 10 is explained as what replaced with the traveling contact member 44 and installed the traveling contact member 94 in the contact surface 16.

[0064] The auxiliary slit 96 of the traveling contact member 94 is a location between the traveling contact part 52 and the 2nd load part 82, and a configuration with the main slit 84 unsymmetrical as a core installs the shape of a straight line 52, i.e., a traveling contact part, from the upper limit edge of the traveling contact member 94 in a lower part. The auxiliary slit 96 divides substantially between the traveling contact part 52 and the 2nd load parts 82, and it acts so that extent permission of both independent relative displacement may be carried out a little. By that cause, in case the traveling contact member 94 carries out contact closing actuation to either of the 1st [which counters], and 2nd fixed contact members 40 and 42 until [after the traveling contact part 52 contacts parts for the other party fixed contact surface 46 and 58 first] an armature 28 results in full adsorption — the flexure for the elastic arm 88, and the twist for a principal piece [90] — in addition, it deforms so that it may bend in the field which connects the bottom edge of the main slit 84, and the bottom edge of the auxiliary slit 96. Consequently, the point of contact P first located focusing on the abbreviation for the traveling contact part 52 comes to move in the different direction of illustration arrow-head B from the arrow head A of drawing 10 gradually until an armature 28 results [from the initial contact] in full adsorption. At this time, according to an operation of the above-mentioned auxiliary slit 96, the amount [in / mainly / a part for a principal piece 90] of twists just before an armature 28 results in full adsorption is reduced compared with the traveling contact member 44 of drawing 10 , this twists, and a load is mitigated. Therefore, the ascent curve of the spring load of the traveling contact member 94 becomes comparatively gently-sloping compared with the traveling contact member 44.

[0065] According to the traveling contact member 94 which has such a configuration, whenever [allowances / of the magnetic-attraction force over a spring load just before an armature 28 results in full adsorption] will increase compared with the traveling contact member 44 which does not have the auxiliary slit 96 and which was mentioned above. Therefore, also when the frictional resistance to point-of-contact migration increases in connection with the dry area on the front face of a contact by the repeat of a contact switching action, it can prevent beforehand un-arranging [whose a spring load exceeds the magnetic-attraction force just before full adsorption of an armature 28]. Therefore, the electromagnetic relay 10 which carried the traveling contact member 94 in the contact surface 16 prevents contact joining, and stable actuation over a long period of time can be realized.

[0066] Drawing 14 shows the traveling contact member 98 by the operation gestalt of further others of this invention which can control effectively a rise of a spring load just before an armature 28 results in full adsorption. The traveling contact member 98 is equipped with a part for the elastic arm 100 which has end face side field 100a which said end face side field for an elastic arm adjoins the dead air space 86 formed between the traveling contact part 52 and the mounting area 56, and is extended in the shape of a curve. In addition, except the configuration for the elastic arm 100, the configuration of the traveling contact member 98 gives a common sign to the component which corresponds since it is substantially the same with the traveling contact member 44 mentioned above, and omits the explanation. Moreover, actuation of an electromagnetic relay 10 is explained as what replaced with the traveling contact member 44 and installed the traveling contact member 98 in the contact surface 16.

[0067] A part for the elastic arm 100 of the traveling contact member 98 is connected with the part directly under the circumference of the traveling contact part 52 at one, and the end face side field 100a has in one the part arranged through dead air space 86 at abbreviation parallel at a part for a principal piece 90, and the part arranged at abbreviation parallel at piece of press fit

56a of a mounting area 56. Thereby by the traveling contact member 98, the die length of end face side field 100a for the elastic arm 100 is increasing compared with the die length of end face side field 88a for the elastic arm 88 in the traveling contact member 44 mentioned above. Consequently, end face side field 100a for the elastic arm 100 is bent by the comparatively small load compared with end face side field 88a for the elastic arm 88 until an armature 28 results [from the initial contact] in full adsorption, in case the traveling contact member 98 carries out contact closing actuation to either of the 1st [which counters], and 2nd fixed contact members 40 and 42. Since the root of end face side field 100a for the elastic arm 100 is in the part directly under the circumference of the traveling contact part 52 instead of a part for a principal piece 90 with it, compared with the case of the traveling contact member 44, it becomes easy to be twisted by the amount of [90] principal piece. Thereby, a twist load [in / mainly / a part for a principal piece 90] just before an armature 28 results in full adsorption is reduced compared with the traveling contact member 44 of drawing 10 R> 0, therefore the ascent curve of the spring load of the traveling contact member 98 becomes comparatively gently-sloping. In addition, the migration direction of the point of contact P in the meantime turns into the direction of illustration arrow-head A like the case of the traveling contact member 44.

[0068] Also by the traveling contact member 98 which has such a configuration, whenever [allowances / of the magnetic-attraction force over a spring load just before an armature 28 results in full adsorption] will increase compared with the traveling contact member 44 with the amount of [88] comparatively short elastic arm mentioned above. Therefore, also when the frictional resistance to point-of-contact migration increases in connection with the dry area on the front face of a contact by the repeat of a contact switching action, it can prevent beforehand un-arranging [whose a spring load exceeds the magnetic-attraction force just before full adsorption of an armature 28]. Therefore, the electromagnetic relay 10 which carried the traveling contact member 98 in the contact surface 16 prevents contact joining, and stable actuation over a long period of time can be realized.

[0069] Drawing 15 shows traveling contact member 98' by the modification. In traveling contact member 98', end face side field 100a for the elastic arm 100 adjoins dead air space 86 in the lower part of the traveling contact part 52, and is installed in the shape of meandering. While end face side field 100a for the elastic arm 100 is bent by the comparatively small load, since the root of end face side field 100a is being isolated from a part for a principal piece 90, it becomes easy to be twisted also by such configuration by the amount of [90] principal piece. Consequently, the ascent curve of the spring load of traveling contact member 98' just before an armature 28 results in full adsorption can be made comparatively gently-sloping.

[0070] As a configuration of end face side field 100a for the elastic arm 100, various configurations other than illustration are employable. Moreover, it will be understood that the configuration for the elastic arm 88 in traveling contact member 44' of drawing 11 and drawing 12 also does so the same operation effectiveness as a part for the elastic arm 100 in that end face side field 88a is extended. In addition, with these configurations, although the stress to the twist direction arises at the root of the end face side fields 88a and 100a for the elastic arm 88,100 at the time of contact closing, it is mitigated and the anxiety of damage on the root of this stress decreases as the distance from a part for a principal piece 90 to the root becomes large. Moreover, the ascent curve of a spring load can also be made much more gently-sloping by carrying out additional formation of the auxiliary slit 96 of the traveling contact member 94 mentioned above in these traveling contact member 44', 98, and 98'.

[0071] The electromagnetic relay concerning this invention can take various gestalten other than the above-mentioned operation gestalt. For example, as shown in drawing 16 , the 1st fixed contact member 40 which has the extension 66 mentioned above is applicable also to the electromagnetic relay which has electromagnet equipment 14' of a configuration of differing in electromagnet equipment 14. This electromagnet equipment 14' turns coil medial-axis line 32a of an electromagnet 26 in the direction of a vertical, and installs it on a part for part I 18 of a base 12. In addition, at drawing 16 , a common reference mark shows the component corresponding to the electromagnetic relay 10 of drawing 3 . Also in such an electromagnetic relay, it can be understood that the same operation effectiveness as the electromagnetic relay 10 shown in

drawing 3 is done so, if it is this contractor.
[0072] Moreover, the traveling contact member 44 which has a part for the elastic arm 88 mentioned above, and the traveling contact members 94 and 98 which have a part for the auxiliary slit 96 mentioned above or the extended elastic arm 100 are applicable also to the electromagnetic relay which can apply also to the electromagnetic relay similarly shown in drawing 16 , or has other various well-known configurations.
[0073]
[Effect of the Invention] While the predetermined distance for insulation between electromagnet equipment and a contact surface is securable in an electromagnetic relay according to this invention, maintaining the predetermined terminal pitch in a contact surface so that clearly from the above explanation, it becomes possible to increase the magnetic-attraction force of an electromagnet, without making a dimension increase. Therefore, according to this invention, the electromagnetic relay which can acquire high structure dependability and the stable operating characteristic is offered.
[0074] The electromagnetic relay which avoids the increment in components mark and can control the rise of a manufacturing cost is offered without furthermore affecting structure dependability and an operating characteristic according to this invention. Furthermore, according to this invention, the electromagnetic relay which can raise the contact life of each contact member in a contact surface is offered.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the decomposition perspective view of the electromagnetic relay by the gestalt of operation of this invention.
[Drawing 2] It is the perspective view shown where the electromagnetic relay of drawing 1 is assembled except for a case.
[Drawing 3] It is the front view of the electromagnetic relay of drawing 2 .
[Drawing 4] It is the perspective view of the electromagnet in the electromagnetic relay of drawing 1 .
[Drawing 5] It is the perspective view of the 1st fixed contact member in the electromagnetic relay of drawing 1 .
[Drawing 6] It is the perspective view of the traveling contact member in the electromagnetic relay of drawing 1 .
[Drawing 7] It is the perspective view of the 2nd fixed contact member in the electromagnetic relay of drawing 1 .
[Drawing 8] It is the side elevation of the electromagnetic relay of drawing 2 .
[Drawing 9] It is drawing of the principal part of the electromagnet in the electromagnetic relay of drawing 1 , and they are the (a) top view and the (b) front view.
[Drawing 10] It is the front view of the traveling contact member of drawing 5 .

[Drawing 11] It is the perspective view of the traveling contact member by the modification.
[Drawing 12] It is the perspective view of the traveling contact member by other modifications.
[Drawing 13] It is the front view of the traveling contact member of the electromagnetic relay by other operation gestalten of this invention.
[Drawing 14] It is the front view of the traveling contact member of the electromagnetic relay by the operation gestalt of further others of this invention.
[Drawing 15] It is the front view of the traveling contact member by the modification.
[Drawing 16] It is the outline front view of the electromagnetic relay by the modification.
[Description of Notations]
12 — Base
14 — Electromagnet equipment
16 — Contact surface
18 — A part for part I
20 — A part for part II
22 — Cylindrical wall
24 — Acceptance slot
26 — Electromagnet
28 — Armature
30 — Winding frame
32 — Coil
32a — Coil medial-axis line
34 — Iron core
36 — Yoke
40 — 1st fixed contact member
42 — 2nd fixed contact member
44, 94, 98 — Traveling contact member
46 58 — A part for a fixed contact surface
48 — A part for the 1st terminal area
50, 56, 62 — Mounting area
52 — Traveling contact part
54 — A part for the 2nd terminal area
60 — A part for the 3rd terminal area
64 — Connection member
66 — Extension
68 — Adhesives
72 — End-winding child member
78 — Hollow
80 — The 1st load part
82 — The 2nd load part
84 — Main slit
86 — Dead air space
88,100 — A part for an elastic arm
88a, 100a — End face side field
96 — Auxiliary slit

[Translation done.]

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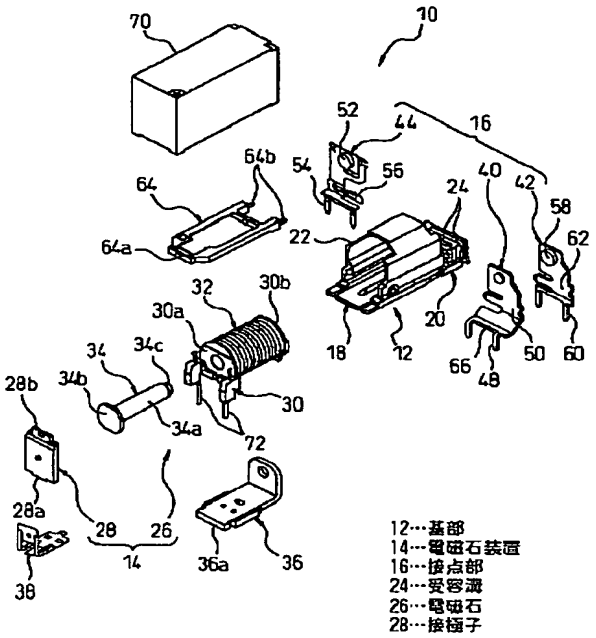
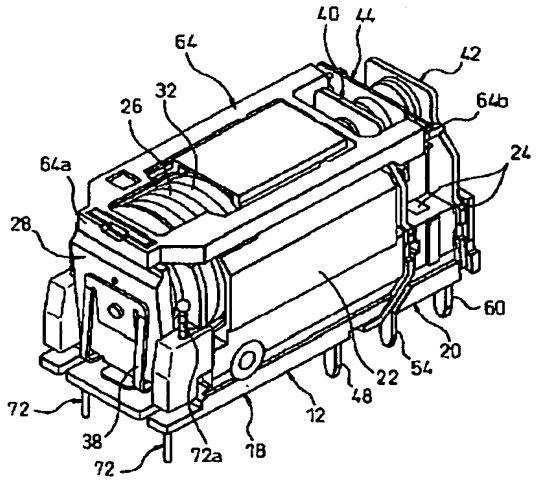
DRAWINGS

[Drawing 1]
図 1 電磁継電器の分解斜視図



[Drawing 2]
図 2 電磁継電器の斜視図

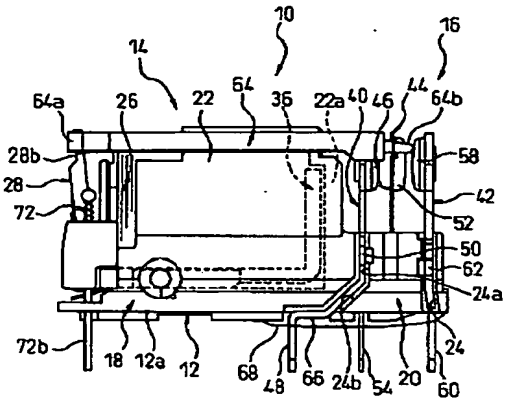


64…通結部材

[Drawing 3]

図 3

電磁接電器の正面図

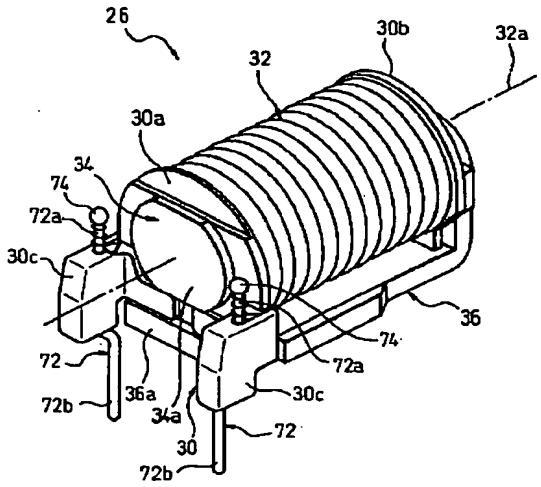


40…第 1 の固定接点部材
42…第 2 の固定接点部材
44…可動接点部材

[Drawing 4]

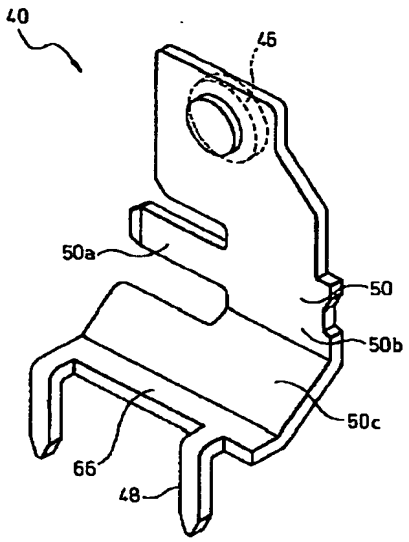
図 4

電磁石の斜視図



[Drawing 5]

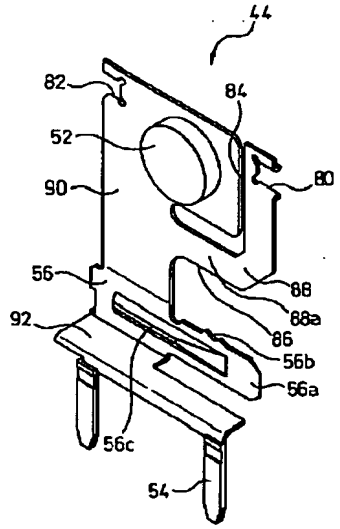
図 5 第１の固定接点部材の図



46…固定接点部分
48…第１端子部分
50…取付部分
66…延長部分

[Drawing 6]

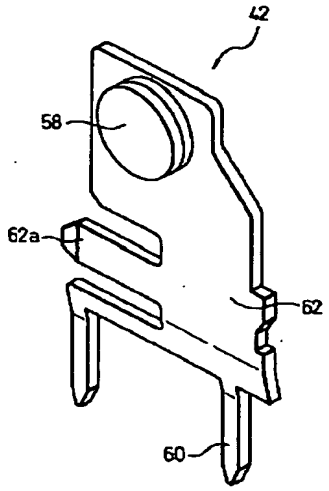
図 6 可動接点部材の図



52…可動接点部分
54…第２端子部分
56…取付部分

[Drawing 7]

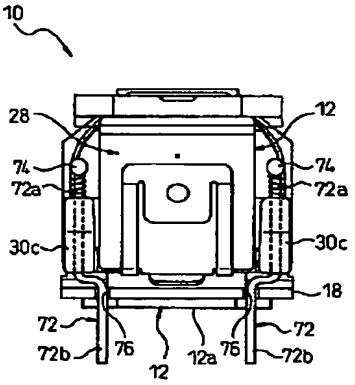
図 7 第２の固定接点部材の図



58…固定接点部分
60…第３端子部分
62…取付部分

[Drawing 8]

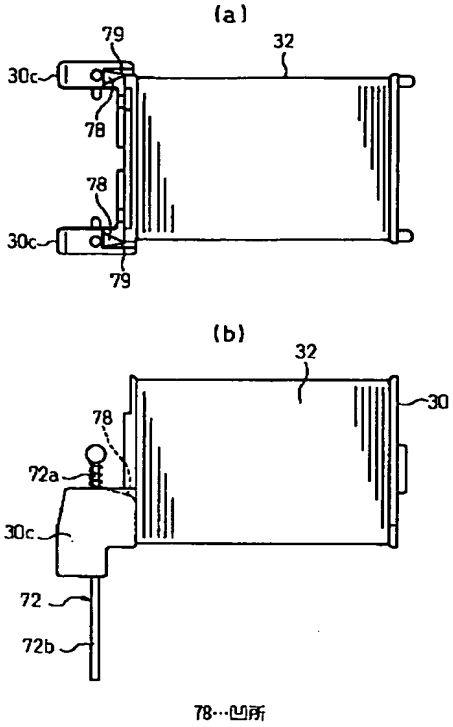
図 8 電磁継電器の側面図



72…コイル端子部材
72a…線端固着部分
72b…端末部分

[Drawing 9]

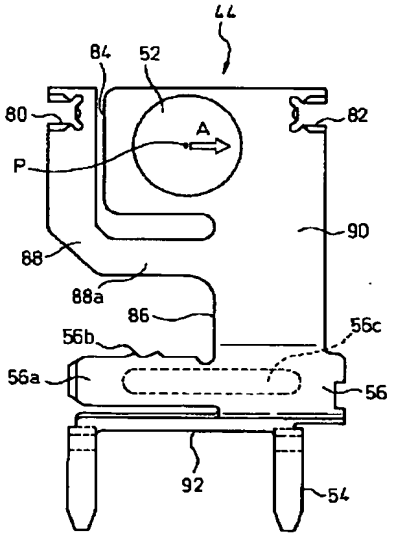
図 9 電磁石の図



78…凹所

[Drawing 10]

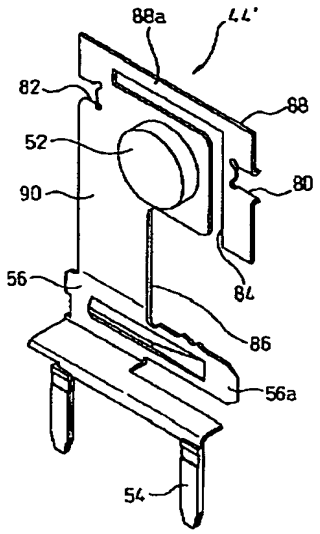
図 10 可動接点部材の正面図



80…第１負荷部分
82…第２負荷部分
84…主スリット
86…空所
88…弾性腕部分
88ａ…基端側領域

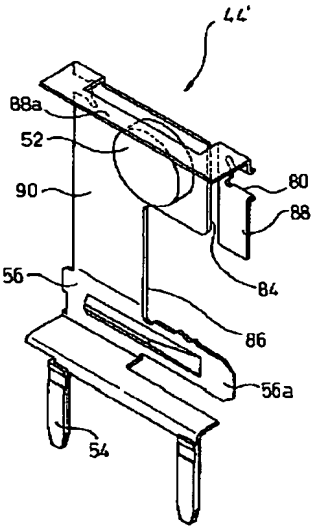
[Drawing 11]

図 11 可動接点部材の変形例



[Drawing 12]

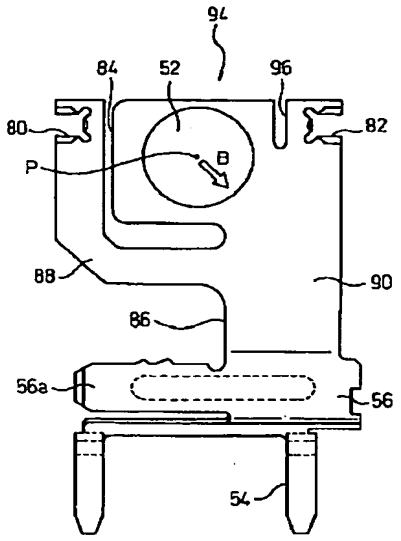
図 12 可動接点部材の変形例



[Drawing 13]

図 13

他の実施形態による可動接点部材

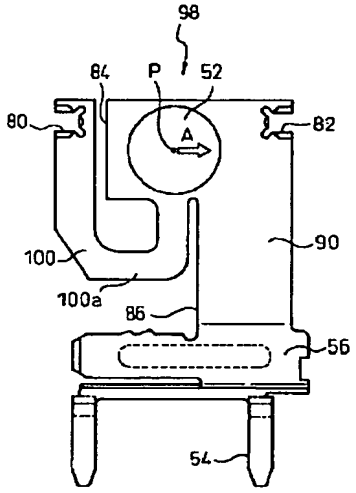


96…補助スリット

[Drawing 14]

図 14

他の実施形態による可動接点部材

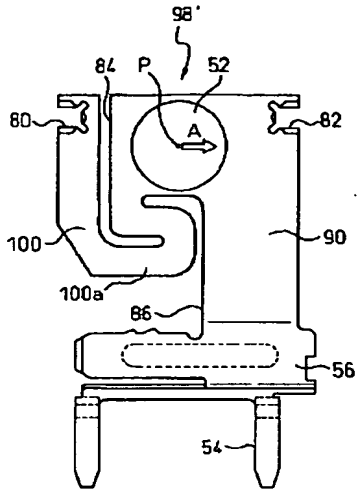


100 …弾性腕部分
100a…基端側領域

[Drawing 15]

図 15

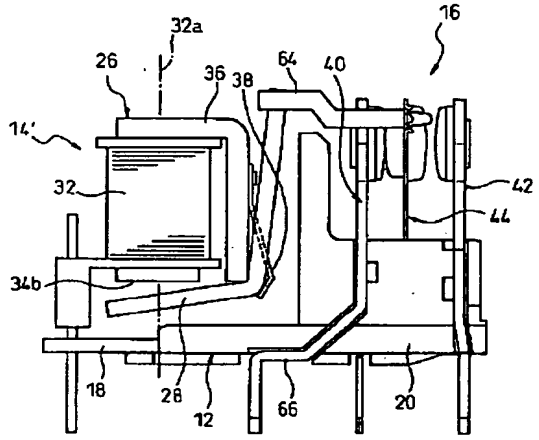
可動接点部材の変形例



[Drawing 16]

図 16

電磁継電器の変形例



[Translation done.]